In the Claims

Please amend Claims 1 and 13. Amendments to the claims are indicated in the attached "Marked Up Version of Amendments" (page i).

1. (Twice Amended) A telecommunications switch comprising:

a plurality of optical inputs;

a plurality of optical outputs;

an optical switch that operates with a schedule not directly determined by the input stream, the schedule of the optical switch being changed to have unbalanced periods in response to unbalance in traffic; and

a plurality of reordering units that rearrange the order of data units within data streams to correspond to the schedule of the switch.

13. (Twice Amended) The method of switching data streams comprising:

operating an optical switch with a schedule not directly determined by the input stream, the schedule of the optical switch being changed to have unbalanced periods in response to unbalance in traffic; and

rearranging the order of data units within data streams to correspond to the schedule of the switch.

REMARKS

Claims 1 and 13 were objected to in view of 35 U.S.C. 112. In particular, the Examiner questioned the use of the two terms imbalance and unbalance. The terms are considered synonymous, and imbalance has been changed to unbalance in each claim.

The Examiner further indicated that the term unbalance rendered the claim indefinite because "the specification does not provide a standard for ascertaining the requisite degree, and

one of ordinary skill in the art would not be reasonably apprised of the scope of the invention." That rejection is respectfully traversed and reconsideration is requested.

The invention does not require any particular degree of unbalance. It is only necessary that unbalance of the optical switch schedule be in response to unbalance in traffic. Accordingly, a small degree of unbalance in traffic may result in a small degree of unbalance in the optical switch schedule. Such would be readily understood by one skilled in the art. Further, the specification clearly indicates a mechanism for determining that unbalance at page 9, second paragraph.

Claims 1-5, 11-17, 23, and 24 are rejected under 35 U.S.C. 103 as being unpatentable over Munter (U.S. Patent 5,475,679). Munter, however, does not suggest these claims because it does not use a switch "that operates with a schedule not directly determined by the input stream" as required by the third element in claim 1. In contrast Munter's system operates the switch by making connections in direct response to cell arrivals on the input stream. Specifically, each time a cell arrives on an input, the input controller sends a connection request to the core control. The core control responds by setting up the requested connection and replying to the input controller with a grant. This operation is described at column 2, lines 47-54, column 3, lines 3-9, column 6 lines 9-12 and lines 51-65, column 7 lines 51-64, and column 8, lines 35-65. The description in column 8 is the most detailed and discloses that the switch schedule is directly determined from input requests.

A key aspect of the present invention, which is not suggested by Munter, is that the switch is operated using a schedule that is not directly determined from the input stream but which takes into account unbalance in traffic such as indicated by the average load between each input/output pair. This indirect control while still allowing response to unbalanced traffic greatly simplifies the task of switch scheduling and control and is a major improvement over the prior art.

Regarding claims 11, 12, 23 and 24, the system of Munter makes connections in response to individual connection requests from the input controllers. This is described in detail in column 8, lines 35-65. Specifically the connection requests are accumulated in a queue that is scanned using a content addressable memory to find the oldest connection request for which the requested input and output are both idle. There is no averaging in Munter's control system; hence, Munter's system does not determine a schedule based on average load. Instead it schedules the switch based on individual requests. Munter's controller does aggregate requests; that is, it handles all of the cells from input port P to output port Q with a single connection. Aggregation, however, is not the same as scheduling based on average load. When scheduling based on average load, individual connection requests (one per cell) need not be communicated to the central control.

Claims 1, 13, and 25 were rejected under 35 U.S.C. 103 as being unpatentable over Haas (U.S. Patent 5,469,284). As with Munter, Haas also does not suggest claims 1 and 13 because it does not include "an optical switch that operates with a schedule not directly determined by the input stream." Haas describes an optical packet switch that uses two switches, called the "scheduling stage" 16 and the "switch stage" 18. These two stages are connected by delay lines of various lengths. Both switches 16 and 18 are scheduled in direct response to the input stream. Specifically, as disclosed in Figures 3 and 7 and in column 6, line 36, to column 7, line 52, the header of each packet is extracted to determine the requested output port. These output port requests are then scanned in order and an iterative circuit (Figure 7) assigns each to a time slot or column. This assignment schedules both switches since the time slot determines the delay required - and hence the setting of switch 16 during the cycle the packet arrives. The time slot also determines the setting of switch 18 at the time the packet exits the delay line. Hence, Haas describes a system where two switches are scheduled in direct response to the input stream; thus Haas does not suggest claims 1 and 13 which recite "a schedule not directly determined by the input stream."

Haas also does not anticipate claim 25 because it does not include "reordering means for rearranging the order of data units within data streams to correspond to the schedule of the switch

means." The delay lines 22 of the Haas application do act to reorder the input data stream. However, this reordering is not done to correspond to the schedule of the switch means; that is, the ordering is not computed in response to the schedule. Further, Haas computes the ordering and the switch schedule jointly as described above.

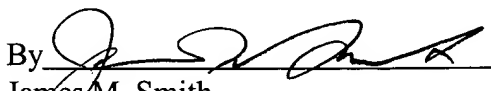
Claims 6-8 and 18-20 were rejected under 35 U.S.C. 103 as being unpatentable over Munter in view of Shively (U.S. Patent 5,978,370), Shively being cited for a showing of a time-slot interchanger. Applicant does not claim that a time-slot interchanger is itself novel. Rather, what is claimed is the use of the time-slot interchanger to reorder units in accordance with base claims 1 and 13. Shively teaches nothing with respect to the deficiencies of Munter discussed above.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned at (978) 341-0036.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By 

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MARKED UP VERSION OF AMENDMENTS

Claim Amendments Under 37 C.F.R. § 1.121(c)(1)(ii)

1. (Twice Amended) A telecommunications switch comprising:

a plurality of optical inputs;

a plurality of optical outputs;

an optical switch that operates with a schedule not directly determined by the input stream, the schedule of the optical switch being changed to have unbalanced periods in response to un[im]balance in traffic; and

a plurality of reordering units that rearrange the order of data units within data streams to correspond to the schedule of the switch.

13. (Twice Amended) The method of switching data streams comprising:

operating an optical switch with a schedule not directly determined by the input stream, the schedule of the optical switch being changed to have unbalanced periods in response to un[im]balance in traffic; and

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